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ABSTRACT

When considering vowel alternations in English, it is possible to develop a less abstract vowel system than the one developed by Chomsky and Halle by using their laxing rule as the input for a restrictive vowel-shift rule which accounts for the relative height of alternating vowels in alternations such as divine-divinity, extreme-extremity, sane-sanity. The underlying representation of these vowels is tense. After the application of the Chomsky-Halle Trisyllabic Laxing Rule, the vowels are lax and are affected by the vowel-shift rule, restricted in scope so that it will cover only lax vowels that participate in alternations. This can be done by restricting the application of the rule to lexical items that have been specially marked. The result is a rule that has plus-rule features which allow a less complicated underlying interpretation. (VM)

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THE VOWEL SHIFT RULE IN ENGLISH

Robert Krohn

A central problem in English phonology is that of postulating underlying representations and a set of rules that will account for the vowel alternations in related words such as *divine-divinity*, *extreme-extremity*, and *sane-sanity*. Chomsky and Halle (1968) have shown that the set of rules needed to account for one type of alternation simultaneously accounts for the other types also. Moreover, these rules for front vowels apply to back vowels as well. Thus Chomsky and Halle have demonstrated that certain alternations, which at first may appear to be separate phonological processes, are actually manifestations of a single process.

In order to account for the vowel alternations, Chomsky and Halle have posited abstract underlying representations, i.e. phonological representations that are distinct from their corresponding phonetic realizations. For example, it is postulated that [a^{I}] and [I] in *divine-divinity* derive from an underlying /i/, that [i] and [ɛ] in *extreme-extremity* derive from /e/, and that [e] and [æ] in *sane-sanity* derive from tense /ǣ/. Although it has

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FL002 352

been claimed that these abstract underlying representations are necessary in order to account for the various alternations, I would like to suggest that we reexamine the case for a less abstract vowel system, one in which the phonological representations corresponding to [a^{I}], [i], and [e] in *divine*, *extreme*, and *sane* are /a^{I}/, /i/, and /e/, respectively. The phonetic realizations of the corresponding vowels in *divinity*, *extremity*, and *sanity* will be accounted for with Chomsky and Halle's laxing rule and a revised vowel shift rule.

The variety of English investigated here is essentially that described by Kenyon and Knott (1953). The vowels are displayed in Figures 1 and 2.

	[+front]	[-front]
[-low, +high]	/i/ *beat* /I/ *bit*	/u/ *loop* /U/ *look*
[-low, -high]	/e/ *bait* /ɛ/ *bet*	/o/ *loan* /ʌ/ *luck*
[+low, -high]	/æ/ *bat*	/ɔ/ *lawn* /a/ *lock*

FIGURE 1

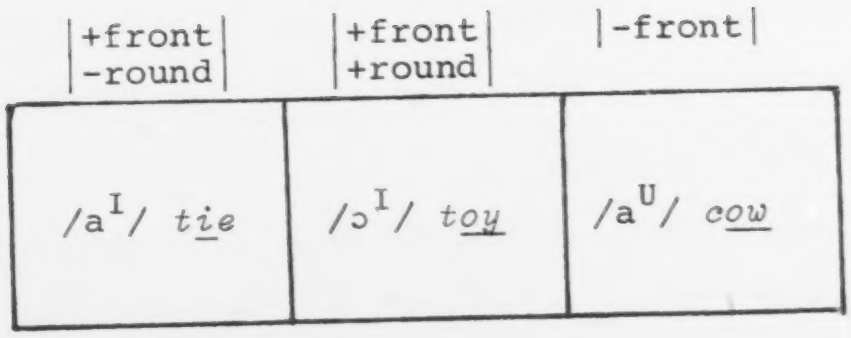

FIGURE 2

The vowels in Figure 2 are 'true' diphthongs, i.e. they have distinctive offglides. By 'distinctive' we mean that without the offglides, the diphthongs would no longer contrast with simpler sound types or with each other. For example, it is the high glide of /ɔ^{I}/ as in *joy* that distinguishes this vowel from /ɔ/ as in *jaw* or /o/ as in *Joe*. And the high offglides of /a^{I}/ and /a^{U}/ distinguish these two sound types from each other. Other putative diphthongs of English, e.g. [e^{I}] and [o^{U}] are not considered to be true diphthongs, since the offglides are nondistinctive. That is, if the second element of [e^{I}] is omitted, the vowel remains distinct from other vowels including its lax counterpart [ɛ]. Whether or not it is pronounced with an offglide, the vowel of *late* will remain distinct from the vowel of *let*. In other words, the offglides of true diphthongs are distinctive; the offglides of other vowels are redundant.

The differences between these two types of vowels have been noted repeatedly in the literature; see, for example, Pike 1947 and Lehiste 1964.

It is reasonable to assume that the phonological representations of /a^{I}/, /ɔ^{I}/, and /a^{U}/ should reflect the fact that these diphthongs consist of low vowels followed by distinctive high glides. A rather straightforward conclusion is that the phonological matrices of true diphthongs contain the features [+low, +high], where the feature [+high] is interpreted as the release feature of a low vowel. Notice that the representation of true diphthongs is parallel to that of affricates in two important ways. (1) Both types of sounds contain distinctive features that are contradictory in that the phonetic realization of one precludes a simultaneous realization of the other. The features [+low, +high] cannot be realized simultaneously since the tongue cannot be in both the low and high positions at the same time. Similarly the features [-continuant, +strident] of affricates cannot be realized simultaneously. Stridency requires airflow; noncontinuality precludes it. (2) Contradictory features must be sequenced. For affricates, [-continuant] precedes [+strident], i.e. /č/ is realized as [tš] not [št]. For English diphthongs, [+low] precedes [+high].[1] The assignment of contradictory features to the

phonological representations of affricates is a well-established practice and, thus provides a precedent for the treatment of true diphthongs.[2]

Having discussed the underlying representations of true diphthongs and other vowels, we can turn now to the problem of accounting for vowel alternations. The alternations of the front vowels are summarized in Figure 3.

Features	Vowel Alternations	Examples
[+low, +high]	a^I	*div<u>i</u>ne*
[-low, +high]	i — I	*extr<u>e</u>me* — *div<u>i</u>nity*
[-low, -high]	e — ɛ	*s<u>a</u>ne* — *extr<u>e</u>mity*
[+low, -high]	æ	*s<u>a</u>nity*

FIGURE 3

The differences in the relative height of the alternating vowels are accounted for by the Vowel Shift Rule:[3]

(1) VOWEL SHIFT RULE

$$\begin{vmatrix} \alpha\text{low} \\ \beta\text{high} \end{vmatrix} \rightarrow \begin{vmatrix} -\beta\text{low} \\ \alpha\text{high} \end{vmatrix}$$

According to the Vowel Shift Rule, the specification ('+' or '-') of the feature [high] to the right of the arrow must agree with the specification of the feature [low] to the left of the arrow. The specification of the feature [low] to the right is the opposite of the feature [high] to the left. Thus the Vowel Shift Rule is an abbreviation of Rules 2, 3, and 4:

(2) $[a^{I} \rightarrow I]$ $\begin{vmatrix} +\text{low} \\ +\text{high} \end{vmatrix} \rightarrow \begin{vmatrix} -\text{low} \\ +\text{high} \end{vmatrix}$

(3) $[i \rightarrow \varepsilon]$ $\begin{vmatrix} -\text{low} \\ +\text{high} \end{vmatrix} \rightarrow \begin{vmatrix} -\text{low} \\ -\text{high} \end{vmatrix}$

(4) $[e \rightarrow æ]$ $\begin{vmatrix} -\text{low} \\ -\text{high} \end{vmatrix} \rightarrow \begin{vmatrix} +\text{low} \\ -\text{high} \end{vmatrix}$

The derivation of words like *divinity*, *extremity*, and *sanity* also includes a laxing rule that applies to the alternating vowels. The underlying representation of these vowels is tense. After the rule applies, the vowels are lax. The part of the rule that applies to *divinity*, etc. is given below as Rule 5.

(5) TRISYLLABIC LAXING RULE (Chomsky and Halle 1968:180, Rule 19b)

$$V \rightarrow [-\text{tense}] \;/\; __\; C\ (C)\ \breve{V}\ (C)\ V$$

Rule 5 applies to any vowel that is followed by two syllables, provided the first contains a lax vowel.

The fact that the Laxing Rule applies to words like *divinity*, *extremity*, and *sanity*, but not to words like *divine*, *extreme*, and *sane* provides a precise way of distinguishing the vowels that undergo vowel shift from those that do not. Lax vowels--as in *divinity*--are shifted, but tense vowels--as in *divine*--are not. Hence, the Laxing Rule provides the input to the Vowel Shift Rule and must apply before this latter rule. In order to restrict the application of the Vowel Shift Rule to lax vowels, we must add the feature [-tense] to the left side of the arrow (see Rule 6).

In addition to preventing the Vowel Shift Rule from applying to tense vowels, we must further restrict the scope of the rule so that it will apply only to lax vowels that participate in alternations, but not to others such as [I] in *bid* and [ɛ] in *bed*. An obvious solution is to restrict the application of the rule to lexical items that have been specially marked. Following this suggestion, we will mark the vowels that undergo vowel shift with the rule feature [+Rule VS], where VS represents the number of the Vowel Shift Rule. The rule feature must be added to the Vowel Shift Rule also, so that it will apply only to marked vowels. The final form of the rule is given

below as Rule 6. With the addition of the features [-tense] and [+Rule VS], the rule will apply to *divinity*, etc. after the operation of the Laxing Rule, but not to *divine*, where the Laxing Rule does not apply, nor to *bid*, where the lax vowel is not marked for the rule.

(6) VOWEL SHIFT RULE

$$\begin{vmatrix} \text{VOWEL} \\ \alpha\text{low} \\ \beta\text{high} \\ \text{-tense} \\ \text{+Rule VS} \end{vmatrix} \rightarrow \begin{vmatrix} -\beta\text{low} \\ \alpha\text{high} \end{vmatrix}$$

Rules that have plus rule features are called minor rules and contrast with major rules, which do not have such features (see G. Lakoff 1965 for an early discussion). I would like to suggest that the classification of a rule as major or minor be considered a hypothesis concerning the relative productivity of the rule. That is, major rules characterize the highly productive processes of a language, minor rules certain less productive processes.[4] By productivity, we are referring to the ability of a rule to apply to new items that have been added to a grammar. Consider, for example, the Plural Suffix Rule, which determines the phonetic characteristics of the plural endings, viz.

[-s], [-z], or [-əz]. The productivity of the rule is attested by recent additions to the language, such as *sputnik-sputniks* and mistakes by children, such as *sheep-*sheeps*.

Since productivity is difficult to measure, I would like to suggest that we consider a substitute procedure, that of examining exceptions to rules in order to infer relative degrees of productivity. We can begin by examining some exceptions to the Vowel Shift Rule. According to this rule, *sane-sanity* and *explain-explanatory* illustrate a regular alternation while *detain-detention* (instead of **detantion*) and *retain-retentive* (instead of**retantive*) are exceptions.[5] The list can easily be lengthened: *retention, retentivity, abstention*, etc. To determine the status of these forms, let us compare some exceptions to the Plural Suffix Rule--*feet* and *sheep*. It can be assumed that speakers know that *feet* and *sheep* are irregular and that **foots* and **sheeps* would be the corresponding regular forms. However, although *feet* and *sheep* are immediately recognizable as exceptions, *detention* is not, nor are speakers normally aware that **detantion* would be the corresponding regular form. **Detantion*--in contrast to **foots* and **sheeps*--is a completely hypothetical form. Although young children and other language learners can be expected to utter words like **foots* and **sheeps*, it

is extremely unlikely that language learners--or any speakers, for that matter--will ever use the form **detantion*. If a rule is highly productive, it readily applies to new items. Moreover, it should, under certain circumstances, e.g. slips of the tongue, apply also to its own exceptions, thereby regularizing them. Thus the plural of *foot* is sometimes regularized to *foots*. However, there is absolutely no tendency for the Vowel Shift Rule to apply to *detain + tion*, thereby regularizing it to **detantion*. Consequently the Vowel Shift Rule can not be considered a highly productive rule of Modern English.

Clearly, the Plural Suffix Rule--a highly productive rule--and the Vowel Shift Rule--a less productive rule--occupy different positions on a productivity-nonproductivity scale. If we accept the view that the classification of rules into major, minor, and other types[6] is a formal means of distinguishing these positions, then the above comparison of exceptions to the Plural Suffix Rule and the Vowel Shift Rule provides support for the conclusion that the latter one is a minor rule.[7]

FOOTNOTES

[1]Mark Lester (personal communication) has suggested that English is a low-high language. That is, in a hierarchy of features, [low] dominates [high]. Presumably this type of ordering is language specific. German is also a low-high language; see K.C. Hill 1969.

[2]In accord with the assumption that true diphthongs are parallel to affricates, K.C. Hill (personal communication) has suggested assigning to certain true diphthongs the feature [+delayed release], which previously had been restricted to consonants such as the nonstrident affricate [t^{θ}]. According to Hill's proposal, the feature [+delayed release] is assigned to true diphthongs in languages having true diphthongs that are not characterized by the contradictory features [+low, +high] or [+front, +back]. For further discussion, see the analysis of Swabian vowels by Dunn (forthcoming).

[3]Although the vowel shift rule presented here differs greatly from that of Chomsky and Halle (1968:187 and elsewhere), it has essentially the same form as rules proposed independently by K.C. Hill (1968:83) and Wang (1968:707). In his presentation, Wang justifies the use of the paired variables α and β, and, in addition, presents a number of criticisms of Chomsky and Halle's rule.

[4]The need for distinguishing various degrees of productivity has not gone unnoticed. Maher (1969), for example, cites an impressive number of items that call for precisely this distinction.

[5]Chomsky and Halle (1968:202) account for *detention* by extending their vowel shift rule so that it applies to specially marked items. *Detention* is marked with the feature [+F] and undergoes the shift from **detantion* to *detention*. It is obvious, of course, that any exception that is accounted for by an ad hoc device is still an exception.

[6]For a discussion of a type of rule located between major and minor rules on the productivity-nonproductivity continuum, see the analysis of regular strong verbs in Krohn 1969.

[7]A very strong distinction between the Plural Suffix Rule and the Vowel Shift Rule is made by Ladefoged (1970:25): ' There is no doubt that we all have the competence to form plurals of new words. These kinds of phonological rules can definitely be said to exist in our minds. But I have serious doubts whether the vowel shift rules have a similar existence.' Although Ladefoged's claim is much stronger than the hypothesis concerning degrees of productivity advanced here, his observations do provide further support for the conclusion that the two rules are of different types.

REFERENCES

Chomsky, Noam and Morris Halle. 1968. The sound pattern of English. New York: Harper & Row.

Dunn, James. (forthcoming). Swabian vowels. University of Michigan dissertation. Ann Arbor.

Hill, Kenneth C. 1968. Some notes on English vowel morphophonemics. Language Learning 18.77-87.

_____. 1969. 'Contradictory features' and German umlaut. Phonetics Laboratory Notes, University of Michigan 4.17-18.

Kenyon, John S. and Thomas A. Knott. 1953. A pronouncing dictionary of American English. Springfield, Mass.: Merriam.

Krohn, Robert. 1969. English vowels. University of Michigan dissertation. Ann Arbor: University Microfilms, Order no. 70-4123. (Corrections: p. 54, delete *run*. p. 63, add *run* to *begin* group. p. 83, l. 5, change *the* to *a*.)

_____. (forthcoming). Contradictory feature specifications and the front vowels of English. General Linguistics.

Ladefoged, Peter. 1970. The phonetic framework of generative phonology. UCLA Working Papers in Phonetics 14.25-32.

Lakoff, George. 1965. On the nature of syntactic irregularity. (Report NSF-16, Mathematical linguistics and automatic translation.) Cambridge, Mass.: Harvard University, Computation Laboratory. (To be published by Holt, Rinehart & Winston, as Irregularity in syntax.)

Lehiste, Ilse. 1964. Acoustical Characteristics of Selected English Consonants. (Indiana University Research Center in Anthropology, Folklore, and Linguistics, no. 34). Suppl. to IJAL 30. 1969.

Maher, J. Peter. The paradox of creation and tradition in grammar: sound pattern of a palimpsest. Language Sciences, no. 7.15-24.

Pike, Kenneth L. 1947. On the phonemic status of English diphthongs. Lg. 23.151-9.

Wang, William S-Y. 1968. Vowel features, paired variables, and the English vowel shift. Lg. 44.695-708.